### COSC/ECE 402 Spring 2016 Class Calendar:

#### January 2016

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<th>Sun</th>
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#### February 2016

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May 2016

Spring 2016 Semester

Classes Begin .................................................. Wednesday ................................................... January 13
MLK Holiday ..................................................... Monday ................................................... January 18
1st Session Ends ........................................... Wednesday ...................................................... March 2
2nd Session Begins .......................................... Thursday ...................................................... March 3
Spring Break ............................................... Monday–Friday ............................................. March 14-18
Spring Recess ............................................... Friday .......................................................... March 25
Classes End ..................................................... Friday ........................................................ April 29
Study Day ....................................................... Monday ..................................................... May 2
Exams ....................................................... Tuesday–Tuesday ..................................... May 3, 4, 5, 6, 9, 10
Graduate Hooding ........................................... Thursday .................................................... May 12
Commencement ........................................... Wednesday–Saturday ................................ May 11-14
Official Graduation Date ................................ Saturday ......................................................... May 14
Class Description (COSC/ECE 402)

COSC 401/402 and ECE 401/402 are the capstone design sequences that must be taken in sequence and are required of all computer science (COSC 401/402), electrical engineering (ECE 401/402), and computer engineering (ECE 401/402) majors. The capstone design sequence is designed to round out the student's education and to integrate and apply the software, system, and theoretical skills that have been acquired throughout the EE/CpE/COSC curriculum. The primary goal of COSC/ECE 401/402 is to learn best practices in technical design, project management, leadership, and teamwork by requiring teams of students to select a design task, and develop, test, and evaluation an appropriate solution.

Student Outcomes (SO x)

The Student Outcomes of the COSC/ECE 401/402 capstone design sequence include:

- an Ability to apply and integrate knowledge of mathematics, science, and engineering to develop a solution to a problem or opportunity (SO a),
- an ability to analyze a problem, and identify and define the computing software requirements appropriate to its solution (SO b),
- an ability to function effectively on multidisciplinary teams to accomplish a common goal (SO d),
- an understanding of professional, ethical, legal, security and social issues and responsibilities (SO e),
- an ability to communicate effectively with a range of audiences (SO f),
- an ability to understand and analyze the local and global impact of computing solutions in a global, economic, environmental, and societal context (SO g), and
- a recognition of the need for, and an ability to, engage in continuing professional development and life-long learning (SO h).

Organization of Teams and the Project Supervisor

Students will work in teams in the senior design sequence. In the second semester (COSC/ECE 402) each team will work with a project supervisor to specify, design and implement a project of mutual interest to the team members and the supervisor. The project supervisor should be viewed as the team's “customer” who wants to utilize the design and implementation the team produces. The project supervisor is also a mentor who can point to information sources the team members may find useful and will serve as a grader who evaluates the team's work product and approves each product (written or oral presentation materials) for submission to the faculty member in charge of the course for a grade. Each supervisor may be a University faculty, staff member, graduate student, or an individual from an organization external to the University who has received approval from the EECS Senior Design Committee to supervise capstone design teams.

Students will have regular meetings with the supervisor and submit written documents and deliver oral presentations as specified below, including a final report in written and oral form. It is expected that each student will have both technical and administrative roles in his or her team.
Multidisciplinary Projects and Projects that include non-EECS Team Members

Multidisciplinary projects (participants outside the department) and projects that include participants external to the University are encouraged but are not mandatory. It is recognized that the constraints of projects that include individuals from outside the EECS department may require adjustment of capstone design course requirements for the EECS students who participate. The instructor has the authority to agree to alternative requirements for these students so long as there are substantially equivalent required written, oral, and design experiences.

Intellectual Property

The vast majority of capstone design projects will be done as an “open source” such that all material and results from the project is openly available to the general public with no constraints from copyrights and patents. But a small number of capstone design projects may lead to the creation by project team members of intellectual property that may have commercial value and that can be protected by patents or copyrights. Unless an alternate agreement is made and signed by all project participants, the University, and the University of Tennessee Research Foundation prior to commencement of work on a project, including faculty, staff, and individuals from outside the EECS department, and in the case of non-University students and employees, authorized representatives of their employers, the University’s policies on disclosure and protection of intellectual property, which are published and publically accessible on the University’s web sites, shall apply. It is recognized that alternate agreements may be essential in some cases, for example when an external entity such as a corporation is involved in a project and provides pre-existing intellectual property for the team’s use. However, all parties must recognize in advance that alternate agreements take time to prepare, review, and negotiate, and the students in the team and their project supervisor must allow sufficient time for this process in advance of commencement of work.

Prerequisites by Course

ECE 401: English 102 and either ECE 315 or ECE 351
ECE 402: ECE 401

COSC 401: English 102 and COSC 365
COSC 402: COSC 401

ECE 401/402 and COSC 401/402 must be taken in consecutive terms (Fall/Spring or Spring/Fall); they are not offered during the Summer term.
Topics that are Covered (COSC/ECE 402)

Note: This a topical list, not a syllabus. See the syllabus for the specific semester to view the timing of the various topics.

- Communications
  - Written Technical Documentation
  - Document Control and Revision Control Systems
  - Presentations: What is your Goal?
  - Presentations: Succinct Communications
  - Presentations: Attitude and Style
- Project Planning and Management
- Bias and Discrimination in the Workplace
- Technology Impact
  - Societal Impact
  - Environmental Impact
  - Economic Impact
  - Governmental Impact
- Professional Development
  - Leadership
  - Innovation
  - Working in a multi-disciplinary and/or business environment
  - Continuing Education
- Ethics
  - Conflict of Interest
  - Licensure
  - Security, Federal Regulations, and Export Control
  - Lobbying and other Political Activities
  - The Digital Workplace
- Intellectual Property
  - Patents
  - Copyright
  - Trademarks
  - Protection through Publishing
- External Speakers (402)
  - by invitation from the business, government, and legal communities

Recommended Reading:


## Scheduled Meeting Times

<table>
<thead>
<tr>
<th>Type</th>
<th>Time</th>
<th>Days</th>
<th>Where</th>
<th>Date Range</th>
<th>Schedule Type</th>
<th>Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>12:40 pm – 1:55pm</td>
<td>TR</td>
<td>Min Kao</td>
<td>14-Jan-2016 - 28-Apr-2016</td>
<td>Lecture</td>
<td>Mark Edward Dean (P)</td>
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<td></td>
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<td>Engineering 622</td>
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Total number of classes – 29 (not including final exam)
Final Exam due May 3.
Check the following website for changes to syllabus: TBD

<table>
<thead>
<tr>
<th>Mtgs</th>
<th>Date</th>
<th>Topic</th>
<th>Materials/Assignments</th>
<th>Misc.</th>
</tr>
</thead>
</table>
| 1    | 1/14/2016  | Introduction to Course, Expectations (grading, attendance, etc.), TA Experiences | **Team Assignment:** Societal Impact Essay and Team Discussion Topic Selected from list provided.  **  
**Individual Assignment:** Societal Impact Essay Topic Selected from list provided.  **  
TA Experience provided by GTA  
List of Topics for Individual Societal Impact Essays provided below ***.  
List of Topics for Team Societal Impact Essays provided below ****. |
| 2    | 1/19/2016  | Manage by Objectives, Project Reporting Requirements, and Technical Writing Overview | Report Template, Gantt chart Template,  
Make students aware of Societal Impacts of Tech. topics and essay due dates.  
**Individual Essays due**  
02/09/2016  
**Team Essays due**  
03/29/2016  
Class covered by GTAs |
| 3    | 1/21/2016  | Leadership Styles                                                      | Lecture 2                                                                                   |                                                                                                                                 |
Start MBO reports, Team Leads report to TA's, report every other week, Odd numbered teams and Even numbered teams on alternate weeks. | Lecture 3                                                                                                                                 |

Start MBO reports, Team Leads report to TA’s, report every other week, Odd numbered teams and Even numbered teams on alternate weeks.
<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Details</th>
<th>Lecture</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1/28/2016</td>
<td>Invention &amp; Innovation – processes, culture, opportunities</td>
<td>Forward request for Project Proposals for Fall 2016. Project Proposals are due no later than 3/31/2016</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>2/2/2016</td>
<td>Invited speaker: “Project Management and Tracking – Do’s and Don’ts” Speaker Ken Gilbert</td>
<td>Online assignment provided the week before. Critical Path Project Management.</td>
<td>Attendence is required Email request sent on 11/19 SPEAKER CONFIRMED (Nov. 19 email)</td>
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<tr>
<td>7</td>
<td>2/4/2016</td>
<td>Ethics: Codes of Ethics &amp; Professional Expectations</td>
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<td>Lecture 5</td>
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<tr>
<td>8</td>
<td>2/9/2016</td>
<td>Invited speaker: “Trade Secrets and the Use of Public-Domain Software,” Dr. Mike Berry / EECS</td>
<td>Individual Assignment Due: Societal Impact Essay **</td>
<td>Attendance is required Email request sent on 11/19 SPEAKER CONFIRMED (Nov. 25 email)</td>
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<td>9</td>
<td>2/11/2016</td>
<td>Invited Speaker: “Ethics: The Digital Workplace,” Mr. Terry Tyler Consulting, Knoxville, TN</td>
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<td>Attendance is required Email request sent on 11/19 SPEAKER CONFIRMED (Dec. 8 email)</td>
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<td>10</td>
<td>2/16/2016</td>
<td>Ethics: - Lobbying and other Political Activities - Case Studies &amp; Discussion</td>
<td>Requirements Document Due (*) Provide questionnaire for take home Ethics Exam.</td>
<td>Lecture 6</td>
</tr>
<tr>
<td>12</td>
<td>2/23/2016</td>
<td>Student Progress Reports and Presentations</td>
<td>Note 3</td>
<td>10 mins/presentation, 7 pres./class max</td>
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<tr>
<td>13</td>
<td>2/25/2016</td>
<td>Student Progress Reports and Presentations</td>
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<td>10 mins/presentation, 7 pres./class max</td>
</tr>
<tr>
<td>14</td>
<td>3/1/2016</td>
<td>Student Progress Reports and Presentations</td>
<td>Progress Report Due (<em>) - All Teams Revised Requirements Doc. Due (</em>) – All Teams</td>
<td>10 mins/presentation, 7 pres./class max</td>
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<td>Date</td>
<td>Activity Details</td>
<td>Notes</td>
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<td>15</td>
<td>3/3/2016</td>
<td><strong>Student Progress Reports and Presentations</strong></td>
<td>10 mins/presentation, 7 pres./class max</td>
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<td>16</td>
<td>3/8/2016</td>
<td>Invited Speaker: “Business Model Canvas – Structure &amp; Use,” Mr. Lynn Youngs, Anderson Center for Entrepreneurship &amp; Innovation, UT</td>
<td>Attendance is required SPEAKER CONFIRMED (Nov. 9 email)</td>
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<td>18</td>
<td>3/22/2016</td>
<td>Invited Speaker: “Patent, Trademark and Copyright Law Essentials for an Inventor or Entrepreneur,” Mr. Andy Neely, Luedeka Neely Group, P.C., Knoxville, TN</td>
<td>Attendance is required Email request sent on 11/19 SPEAKER CONFIRMED (Nov. 19 email)</td>
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<td>19</td>
<td>3/24/2016</td>
<td>Societal Impacts of Technology Topical Discussion.</td>
<td>Lecture #8 Attendance is required</td>
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<td>20</td>
<td>3/29/2016</td>
<td>Societal Impacts of Technology Team Topical Discussion Team to present major points covered in team discussion on Social Impact. No presentation material required.</td>
<td>Attendance is required. Topic area to be selected from list provided. 10 mins/team to cover insights drawn from team discussion</td>
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<td>21</td>
<td>3/31/2016</td>
<td><strong>Student Presentations: Implementation (*)</strong> Also use this time to discuss lessons learned, challenges experienced and issues still unresolved by each design team. Enables sharing of team experiences to broader audience.</td>
<td>Note 3 Design Document Due (*) Project Proposals for Fall 2016 Due Today. 10 mins/presentation, 7 pres./class max</td>
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<td>Date</td>
<td>Event Details</td>
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<td>4/5/2016</td>
<td><strong>Student Presentations: Implementation (*)</strong></td>
<td>10 mins/presentation, 7 pres./class max</td>
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<td>4/7/2016</td>
<td><strong>Student Presentations: Implementation (*)</strong></td>
<td>10 mins/presentation, 7 pres./class max</td>
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<td>4/12/2016</td>
<td><strong>Student Presentations: Implementation (*)</strong></td>
<td>Teams will leverage extra time after project presentations to work on projects and/or ask questions related to completion of projects. 10 mins/presentation, 7 pres./class max</td>
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<td>4/14/2016</td>
<td><strong>Invited Speaker: Tom Rogers</strong>&lt;br&gt;Industrial &amp; Economic Development Partnerships&lt;br&gt;Oak Ridge National Laboratory&lt;br&gt;Topic - TBD</td>
<td>Attendance is required&lt;br&gt;Email request sent on 11/19&lt;br&gt;SPEAKER CONFIRMED (Nov. 19 email) by: Kelly A. (Collins) Wampler Administrative Assistant to Tom Rogers Office: (865) 576-9294</td>
<td>Email: <a href="mailto:wamplerka@ornl.gov">wamplerka@ornl.gov</a></td>
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<td>4/19/2016</td>
<td><strong>Invited Speaker (TBD): “Confidence Intervals,” Dr. Tsewei Wang, ChBE Slides</strong>&lt;br&gt;<strong>Test Plan and Evaluation Results Due (*)</strong></td>
<td>Attendance is required&lt;br&gt;Email request sent on 11/19&lt;br&gt;SPEAKER CONFIRMED (Nov. 23 email):</td>
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<td>4/21/2016</td>
<td><strong>Invited Speaker (TBD): “Hypothesis Testing,” Dr. Tsewei Wang, ChBE Slides</strong>&lt;br&gt;<strong>Poster Details - Note 2</strong></td>
<td>Attendance is required&lt;br&gt;Email request sent on 11/19&lt;br&gt;SPEAKER CONFIRMED (Nov. 23 email):&lt;br&gt;All Final Presentation Posters are to be ordered by NOON 04/21/2016 at UCopy in the Student Center in order to given UCopy sufficient time to print them by noon on the following Monday.</td>
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<td>4/26/2016</td>
<td>No Formal Class, Teams to leverage to complete projects and ask questions to TA’s/Faculty</td>
<td>Final Report Due (*)</td>
<td>Attendance is not required</td>
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<td>4/28/2016-4/29/2016</td>
<td>Note 1 &amp; 2</td>
<td>Note 1 &amp; 2</td>
<td>Each 402 student must evaluate every 402 project/poster during the poster session. Evaluation of the 401 projects/posters is TBD. Every 402 student is expected to evaluate half of the 401 projects during their poster session.</td>
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<td>5/5/2016</td>
<td>Take-Home Final Essay due at the beginning of the Final Exam Period (submit using Blackboard)</td>
<td>Class assessment due</td>
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**Note 1:** Final Presentation Posters for 402 are to be displayed beginning at 12:00pm and ending at 5:00PM. The poster will be displayed in the 2nd and 3rd floor atrium, with overflow space TBD if required. At least one representative from each team in ECE/COSC 402 must be present 12:00pm - 5:00PM each day. Posters, including easels, backing boards, and any other supplies are to be removed at the end of each session and stored in the Senior Design Laboratory rooms.

**Poster Session:** Poster Session: Presentations of Final Projects. Every student MUST talk with a person present with each poster in both 401 and 402 (approx. XX posters) and fill out an online rating form for each poster and presentation/interaction. The rating forms will be accessible using QR codes and short URLs printed on the posters.

**Note 2:** Posters must be 24” (horizontal) x 36”, printed flat/matte and laminated on both sides. No backing material is to be ordered (e.g., “foam core”) and charges for backing will not be paid by the department. Backing boards and push pins will be provided at the poster sessions. The EECS department is paying for these posters by direct bill, and this will be arranged with the UCopy manager, Mr. Chris Lowe. He will have a list of the teams, team leaders, and the team leaders’ email addresses. More Information

**Note 3:** The day and order of all team presentations will be scheduled ahead of time. The scheduling of these presentations will occur early in the semester and their order will be randomly selected. Teams should integrate the scheduled timing of their presentations into their project plan and leverage the advanced notice provided.

* An Extremely Important Note: All reports and presentations listed with a (*) must be signed-off (approved) by the team’s project supervisor/customer prior to submission. Student teams must allow at least one week for project supervisor’s review of each report. Failure to abide by this requirement can result in failure of the course.
**ECE/COSC 402 will feature two aspects of Societal Impacts this semester. The first will be an individual essay where students may choose from the Individual Topics listed below. The second will be a team essay which students will then discuss during the societal impacts discussion classes (on 3/29). Teams will be discussing their own paper topics during these classes and attendance is required. Topics for team papers are also listed below. Individuals and teams may develop their own topics and submit them for approval by Dr. Dean, however this must be done no later than one week before the due date of the societal impacts essay.**

*** List of Topics for Individual Societal Impact Essays provided below –

- Net Neutrality
- Self-Driving Cars or Autonomous Vehicles
- Vehicle-to-Vehicle & Vehicle-to-Infrastructure Communications (controls, information sharing, location analysis, driving analysis, ...)
- Genetic Engineering and GMOs (animals, humans, plants)
- Alternative Energy Sources (fuel cells, micro-nuclear plants, solar, wind, ...) and Energy Storage
- Commercialization of Space (travel, mining, computing services, tourism, ...)
- Additive Manufacturing and 3D Printing (including food, metals, plastics, carbon fiber, ...)
- Online Stores (Alibaba, Amazon, Zappos, ...)
- Evidenced Based Health Care
- Entertainment and Media on Technology
- Electronic Currency (Bitcoin, ApplePay, ...)
- MOOCs (Massively Open Online Courses) and Online Learning
- Mega-scale Water Desalinization
- IoT (Internet of Things)
- Bio-Sensors and Monitoring Devices
- Fast Low-Cost DNA sequencing (less than $100 and less than 30mins) – DNA Transistor, Liquid Biopsy, ...
- Internet of DNA (global network of millions of genomes openly available)
- Personal Robots
- Neuro-Inspired Computing
- Cyborg Technologies, Mechanical Implants, and/or Augmentation of Human Abilities
- Nano-Machines
- Malware and Ransomware

Note: Other topics proposed must be approved by the professor in charge of the class.

*** List of Topics for Team Societal Impact Essays provided below –

- Big Data Analytics
- Social Media and Social Networks (Facebook, Twitter, ...)
- Open Source
- Cloud Computing, Online Computing Services, Computing as a Utility
- “Topcoder” code development model (open competition based coding model)
- Cyber-Warfare or Government sanctioned cyber spying and cyber terrorism
- Continuous monitoring w/ real-time recognition in public places (video, audio, sounds, gases, satellite images, ...)
• Electric Cars, Fuel Cell Cars
• Smartphones, Smartwatches
• Hydraulic fracturing or “fracking”
• Drones and UAVs
• Hydroponics and Factory based Agriculture
• Low Cost Water Purification Technologies for 3rd World Countries
• 3D Visualization
• Car Sharing, Ride Sharing and Taxi Services (ZipCar, Uber, ...)
• Electronic Medical Records (EMR)

**Societal Impact Essay Guidelines:**

- 3-5 pages in length of text, 12pt Times Roman font (or equivalent), single spaced
- Pictures, graphs, tables and charts are encouraged (for clarity and to support your arguments)
- Essay should clearly describe the technology, its use and how the technology will have a positive and/or negative effect on society. Use scenarios, including pros and cons, should be clearly described.
- Societal impacts papers must have a minimum number of three (3) sources/citations.
- Societal Impacts include effects (positive or negative) on the following:
  - Culturalism, Diversity, Equality
  - Communications and Media
  - Environment and Climate
  - Work and Operational Efficiencies
  - Government
  - Industry
  - Isolationism, Globalization, Collaboration, Nationalism
  - Markets, Currency, Payment, ...
  - Business Models
  - Individual, Family and Community Economics (wealth, poverty, economic class migration, ...)
Elements of Final Grade (COSC/ECE 402)

High Level Elements:
- Project documents, reports and presentations = 60% of grade
- Exams = 20% of grade
- Class assignments = 20% of grade
- Attendance = 85% of all classes (25 classes), 8-of-9 guess lectures and at least one of each special section lectures (ethics, societal impact) to avoid loss of grade points. Failure to meet attendance requirements will deduct 0.7 grade points out of a 4.0 grade scale for every 1-4 classes missed beyond the first 4 missed ones allowed and/or for every guess lecture missed beyond the first one missed and/or for everyone special topic lecture set missed.
  * Example #1: if 5-8 classes and/or 2 guess lectures are missed, 0.7 grade points (from a scale of 4.0) will be deducted from your final grade.
  * Example #2: if 9-12 classes are missed, 1.4 grade points (from a scale of 4.0) will be deducted from your final grade.
  * Example #3: if 3 guess lectures are missed, 1.4 grade points (from a scale of 4.0) will be deducted from your final grade.
- Note: A grade of “C” or better is required to graduate.

Detail Grade Distribution:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Requirements Document</td>
<td>5%</td>
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<tr>
<td>Progress Report Presentation</td>
<td>5%</td>
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<td>Progress Report</td>
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<td>Implementation Presentation</td>
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<td>Design Document</td>
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<td>Test Plan and Evaluations Results</td>
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<td>MBO Reports</td>
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<td>MBO Report (Week of Nov. 24)</td>
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<td>Societal Impact Paper – Individual</td>
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<td>Ethics Exam</td>
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<td>Final Exam</td>
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Attendance – Invited Speakers
- 2/2,
Attendance – Ethic Lecture (at least one)
Attendance – Societal Impact Lecture (at least one)
Attendance Total – at least 85%

Course Personnel:

- See https://design.eecs.utk.edu/personnel
  - Faculty member in charge: Dr. Mark E. Dean
    - email: markdean@utk.edu
    - phone: 865-974-5784
    - Office hours: 3:30-5:00pm, Tuesday & Thursday
      - The best way to contact me if via email or during office hours.
  
- IT Help: https://ithelp@eecs.utk.edu

- GTAs:
  - Kelley Deuso – kmccoy4@vols.utk.edu
  - Derek Lusby – dlusby1@vols.utk.edu
  - Greg Simpson – gsimpso3@vols.utk.edu
  - Office hours TBD, GTA office – MK321

- External consultant: Dr. Bruce Lipscombe (to be confirmed)
  - Serves as a “project trouble-shooter”
  - Has extensive experience in world wide engineering with the UN and the World Bank

- Other faculty members providing assistance (to be confirmed)
  - Dr. Roger Horn – rhorn@utk.edu
  - Dr. David Icove – icove@utk.edu

Policy on Lectures:

- Emphasis of class – The Project
  - Team work
  - Leadership Skills
  - Presentation and Communication Skills
  - Project Management, Planning, Scheduling

- Lectures by external speakers scheduled as listed in syllabus
  - Attendance is required (8 of 9 lectures)
  - Attendance tracked via QR code sign-in, website login or signup sheet within 15mins of beginning of class

- Pay attention to the Syllabus for specifics on class discussions.

- Lectures will cover:
• Ethics
• Societal Impact of Technology
• Intellectual Property
• Leadership Styles
• Innovation and Entrepreneurship
• Project Management
• Bias and Discrimination

Instructions for order requests:
All order requests must be sent to orders@eecs.utk.edu. Please include the class number and team/project identifier in the subject and a brief description of the specific need for the order in the email body. Order requests must be approved by Dr. Dean before being completed. Please CC Dr. Dean on the email and ask that he approve the request. Dr. Dean will then reply to the email letting Shipping and Receiving know that the request has been approved. Shipping and Receiving will contact you when your order has been received. Orders can be picked up in MK108. Please direct all questions re ordering or reimbursement to orders@eecs.utk.edu.

Work Items:
- Make essay template and/or examples available online (website and/or Blackboard).
- Schedule Guest Speakers